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Technical Lesson 67

PHOTORADIOGRAMS - BEAM TRANSMISSION

Photoradiograms and television have many things in common. Light, lenses, photoelectric cells, amplifiers and radio signals all play an important part in both. The theory we studied in Part I of Television will materially assist us in this lesson.

Photography, which has not been covered, has its use in photoradiogram work, but only that part sufficient to give us an idea of what the terms "positive" and "negative", as applied to films and prints, will be taken up. The taking and finishing of a photograph requires five operations; namely, the preparation of the plate, exposure of the plate to light rays, developing of the plate, the fixing of the plate and, finally, the printing of the picture.

In the preparation of a photographic plate a solution of silver bromide is precipitated, that is, caused to separate and then held in a watery suspension of gelatine. The gelatine mixture is maintained at a warm temperature and allowed to age, thus rendering it more sensitive to light rays. This mixture, better called emulsion, is then applied to glass plates or is spread over strips of transparent celluloid. If we speak of photographic plates we refer to the glass plate, if a film is mentioned we refer to the emulsion covered celluloid strip. Plates are not usually employed by the amateur photographer; either film pack or film rolls are used.

When this prepared film is exposed to light by the opening of a shutter allowing light to enter the camera through a lens, the rays of light fall upon the prepared gelatine surface and a chemical change takes place, which to the eye produces no visible effect. But the silver bromide under proper treatment can now be more easily reduced to metallic silver and this reduction will be in proportion to the intensity of the light that falls upon the surface containing the silver bromide. To bring this reduction about a reducing agent, which is an alkaline solution of pyrogalllic acid or hydro-quinone, is applied and possesses such slight activity that its effect on portions of the bromide film not exposed to illumination is practically zero. This reduction works very rapid and deposits more metallic silver where the illumination is of the greatest intensity.

This explains why the film becomes more opaque where the object being photographed is brightest and more transparent where the object was the darkest. Because of this reversal the name "negative" is given the developed plate or film. Since white light rays are the ones to most affect the bromide during the exposure the developing is carried out under a red light which has practically no action on the silver bromide. If nothing further were done with the developed film, daylight would in time gradually reduce the remaining unchanged bromide to silver, therefore, the developed film is placed in a "fixing" bath or hypo, where the bromide is dissolved out. The negative is now placed in a